

REMARKS

Status of the Claims

Claims 1, 2, and 5-7 are pending in this application.

Claims 1, 2 and 5-7 are rejected.

Claims 3, 4, and 8 have been cancelled.

Claims 9-22 have been withdrawn.

Rejection of Claims 1-2, 5 and 6-7 Under 35 U.S.C. § 103

Claims 1-2, 5 and 6-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,538,645 issued to Perach (hereafter "Perach '645") in view of U.S. Patent No. 5,707,039 issued to Hamilton et al. (hereafter "Hamilton '039"), and U.S. Patent No. 5,135,027 issued to Miki et al. (hereafter "Miki '027"). In order for the proposed references to be relied upon, a person having ordinary skill in the art at the time of the invention must have been motivated to modify the references based on the teaching of those references.

In order to establish a *prima facie* case of obviousness, three criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the applied reference must teach or suggest all the claim limitations.

The Examiner has asserted that it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the flux tube design with a pole piece of Perach, as suggested by Hamilton et al., for the purpose of increasing activation force.

Claim 1 is an independent claim which includes the elements of a pole piece and flux tube operably associated with said armature for moving said armature in a first direction upon energizing said coil. These elements are not taught or suggested by Perach '645. Perach '645 teaches or suggests a control valve assembly 10 includes a valve body 20 and an electromagnetic coil 22 which extends circumferentially about the valve body. The valve body has a housing 24 and a cavity 26. An armature 28 is disposed in the cavity. *Col. 3, Lines 22-26*. Additionally, Perach '645 also teaches that the armature has a poppet 66 which is disposed in the control chamber and which is adapted by a first frustoconical surface 68 to engage the control seat and is adapted by a second frustoconical surface 70 facing the second direction to engage the exhaust seat. *Col. 4, Lines 18-23*. No where in Perach '645 is the mention of a pole piece and flux tube operably associated with said armature for moving said armature in a first direction upon energizing said coil in a similar manner taught by the present invention. The bobbin 38 substantially extends the length of the armature 28, as shown in Figure 1 of Perach '645, and there is no flux tube. Therefore, Hamilton '039 must make up for the deficiencies of Perach '645 or the rejection will fall.

Hamilton '039 fails to make up for the deficiencies of Perach '645. Hamilton '039 teaches or suggests a linear solenoid valve 10 has an electromechanical portion generally designated by the numeral 15 and a hydraulic portion generally designated by the numeral 20. The hydraulic portion 20 comprises fluid passage housing 51 including fluid inlet 53, chamber 55, poppet seat 59 and fluid exhaust passages 57. *Col. 2, Lines 31-35*. Hamilton '039 also teaches that poppet 43, which is displaceable between a seated position against poppet seat 59 as illustrated, and a fully unseated position, provides for a variable fluid bleed-off from fluid inlet 53 to exhaust passages 57. *Col. 2, Lines 36-39*. Hamilton '039 also teaches or suggests that ferromagnetic pole pieces,

generally designated, 31 and 34 are located adjacent the coil at opposite axial ends thereof. *Col. 2, Lines 48-50.* Pole piece 34 has a central aperture defined by the annular portion 33 and preferably continues generally within the inner sidewall of the spool to define an axially extending cylindrical portion 35 with similarly sized aperture. *Col. 2, Lines 53-56.* Contrary to the Examiner, the cylindrical portion 35 does not facilitate the motion of the armature 41. Hamilton '039 teaches or suggests that the collar 17 is substantially aligned with the terminal portion of the tapered side 45 of armature 41, the flux therebetween generally providing increased axial motive force at a higher current level as the armature is increasingly displaced towards the left of the figure. When the armature is in the full rightward position as illustrated, however, the majority of axial motive force is impressed vis-à-vis the flux between the tapered sidewall and the cylindrical portion of the pole piece 31. *Col. 3, Lines 51-59.* Hamilton '039 specifically states that the cylindrical portion of the pole piece 31 is used for facilitating the motion of the armature 41. Hamilton '039 does not teach or suggest that the cylindrical portion 35 of the pole piece 33 is used for facilitating motion of the armature 41. Hamilton '039 makes no mention of a pole piece and flux tube operably associated with said armature for moving said armature in a first direction upon energizing said coil, as recited by claim 1 of the present invention. Therefore, Perach '645 cannot be combined with Hamilton '039 to arrive at the present invention.

Additionally, the Office Action mentioned the Miki '027 patent, but did not apply the Miki '027 patent to a specific rejection. However, Miki '027 cannot be combined with Perach '645 to arrive at the present invention. Miki '027 teaches or suggests a solenoid device portion 20 comprises a core 21 of an electromagnet, a spring 22, a plunger 23 mounted axially aligned with the core 21, a coil 27, a push rod 24, a spacer 25 made from a non-magnetic material, and a conductive plunger sleeve 26 mounted at the front

end of the outer circumference of the core 21 and the plunger 23, a cylindrical bobbin 28, a case 33, and a yoke 32. *Col. 3, Lines 3-9.* Although Figure 1 shows the conductive plunger sleeve 26 surrounding the plunger 23, the conductive plunger sleeve 26 is not used for facilitating the movement of the plunger 23. Miki '027 teaches or suggests that when an electrical current is supplied to the plug 35 to energize the coil 27, the plunger 23 is attracted rearward against the force of the spring 22 as shown in FIG. 1(b). *Col. 4, Lines 41-44.* Miki '027 does not teach or suggest a pole piece and a flux tube operably associated with said armature for moving said armature in a first direction upon energizing said coil, as recited by claim 1 of the present invention. Therefore, Perach '645 cannot be modified using Hamilton '039 or Miki '027 to arrive at the present invention.

For at least these reasons, Applicant submits that Perach '645 in view of Hamilton '039, and further in view of Miki '027, does not teach or suggest the inventive combination of the elements of claim 1, and that the Office Action fails to establish a *prima facie* case of obviousness because at least one of the three criteria have not been met, and claim 1 is allowable over the applied art. Claims 2, 5, and 6-7 are dependent upon claim 1, and are likewise allowable over the applied art, taken singly or in combination since they include all of the subject matter of the base claim, which is believed to be in condition for allowance. Withdrawal of the rejection is respectfully suggested.

The Examiner also rejected claims 4-5 and 8 under 35 U.S.C. § 103(a) as being unpatentable in view of Perach '645, as modified, as applied to claim 1 above, and further in view of U.S. Patent No. 5,752,689 issued to Barkhimer et al. (hereafter "Barkhimer '689"). The Examiner has asserted that it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a ball

type valve design of Barkhimer et al. for the valve of Perach, as modified, for the purpose of maintaining a superior seal. Applicant respectfully traverses the rejection.

As previously mentioned, Perach '645 teaches or suggests a control valve assembly 10 includes a valve body 20 and an electromagnetic coil 22 which extends circumferentially about the valve body. The valve body has a housing 24 having a cavity 26. An armature 28 is disposed in the cavity. *Col. 3, Lines 22-26*. Additionally, it was also previously mentioned that Perach '645 teaches or suggests that the armature has a poppet 66 which is disposed in the control chamber and which is adapted by a first frustoconical surface 68 to engage the control seat and is adapted by a second frustoconical surface 70 facing the second direction to engage the exhaust seat. *Col. 4, Lines 18-23*. As previously shown, the present invention is not rendered obvious by Perach '645. Therefore, Barkhimer '689 must make up for the deficiencies of Perach '645, or the rejection will fall.

Barkhimer '689 does not make up for the deficiencies of Perach '645. Barkhimer '689 teaches or suggests a solenoid 54 includes the cylindrical support tube 66, a coil 90, a pole piece 92, and a plunger 94. *Col. 5, Lines 28-30*. Barkhimer '689 also teaches or suggests that energization of the coil 90 causes the plunger 94 to move forwardly or downwardly as illustrated in FIG. 2 to drive the valve ball 76 away from the seat 74 and into contact with the stop 78, thereby opening the valve. *Col. 7, Lines 15-18*. Barkhimer '689 makes no reference to the use of the pole piece 92 being used to facilitate motion of the plunger 94. Therefore, Barkhimer '689 does not teach or suggest a pole piece and a flux tube operably associated with said armature for moving said armature in a first direction upon energizing said coil, as set forth in claim 1. Neither Perach '645 nor Barkhimer '689 individually, as well as the combination of Perach '645 and Barkhimer '689, can be used to arrive at the present invention having a pole piece

and a flux tube operably associated with said armature for waving said armature in a first direction upon energizing said coil, as set forth by claim 1.

Therefore, Perach '645 cannot be combined with Barkhimer '689 to arrive at the present invention. For at least these reasons, Applicant submits that Perach '645 in view of Barkhimer '689 does not teach or suggest the inventive combinations of the elements of claim 1, and that the Office Action fails to establish a *prima facie* case of obviousness because at least one of the three criteria have not been met, and claim 1 is allowable over the applied art. Claims 4-5 and claim 8, which depend upon claim 1, are likewise allowable over the applied art, taken singly or in combination since they include all of the subject matter of the base claims, which are believed to be in condition for allowance. Withdrawal of the rejection is respectfully requested.

The Examiner also stated that regarding claims 2, and 6-7, the specific control functions, bias states and valve positioning would have been an obvious design consideration dependent upon the specific application of the hydraulic valve. Applicant respectfully disagrees.

Applicant notes that claims 2 and 6-7 are dependent upon claim 1. Claim 1 is an independent claim which has not been rendered obvious by any of the prior art cited by the Examiner or has been claimed to be obvious by the Examiner. Therefore, claims 2, and 6-7, which include all the limitations of claim 1, would not have been an obvious design consideration dependent upon the specific application of the valve. Applicant respectfully requests withdrawal of the rejection.

CONCLUSION

It is respectfully submitted that in view of the above amendments and remarks the claims 1,2, and 5-7, as presented, are patentably distinguishable because the cited patents, whether taken alone or in combination, do not teach, suggest or render obvious, the present invention. Therefore, Applicant submits that the pending claims are properly allowable, which allowance is respectfully requested.

The Examiner is invited to telephone the Applicant's undersigned attorney at (248) 364-4300 if any unresolved matters remain.

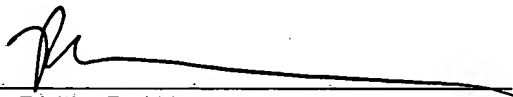
Respectfully submitted,

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